

Work Plan for Fiscal Year 2002

March 6, 2002

I. Program Title. Ecological/Water Systems Operations Models, CVPIA Section 3406 (g)

II. Responsible Entities.

	Agency	Staff Name	Role
Lead	USBR	Lloyd E. Peterson	Program Manager
Co-Lead	USFWS	Andrew Hamilton	Program Manager

III. Program Objectives for FY 2002.

The program objectives are enumerated below. The source documents for these objectives are noted and their relationship, if any, to the CALFED Program Ecosystem Restoration Program Implementation Plan. The program objectives have been cross-referenced against the actions the program will undertake in Fiscal Year (FY) 02 in Section VI below.

A. Continuing support for the development of CALSIM II. CALSIM II is a reservoir system model that is an application of the CALSIM software developed by the California Department of Water Resources (DWR). An initial application, CALSIM I, was developed by DWR to replace their model of the State Water Project, known as DWRSIM. CALSIM II is now under joint development by DWR and Reclamation and expands CALSIM I by adding the functionality of Reclamation's PROSIM, SANJASM, and STANMOD, the reservoir system planning models used to manage the Central Valley Project (CVP). CALSIM II is the only model heretofore to address implementation of 3406(b)(2) and the Environmental Water Account. Interior is benefitting greatly from DWR's investment, but it is essential for Interior interests that Interior maintain a high level of participation. Accepted applications in support of CVP yield increase are expected in this FY.

B. Continued support for the development of updated temperature model applications on the reservoirs and rivers of the Central Valley, and of the Trinity River system. Activity underway involves building a Graphical User Interface (GUI) to the most recent model applications on the Stanislaus and Sacramento Rivers. This has taken advantage of model development funded by other entities, the Corps for development of the GUI and other groups in application of temperature models. The GUI increases the ease of use by modeling staff and supports presentation of results to stakeholders. Continued refinement of the GUI and incorporation of already developed models on the Trinity and American Rivers is planned for this FY.

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C. Development of a comprehensive documentation of the hydrologic data required to support CALSIM II, including description of procedures for extending these data to be packaged in a media available to Bureau of Reclamation (USBR), Fish and Wildlife Service (USFWS) and stakeholders. This more rigorous documentation is essential to preserve what has in the past been considered corporate memory.

D. Development of documentation of the application of CALSIM, i.e. a CALSIM users manual. This is essential in order to make CALSIM readily usable, a primary objective of 3406(g) funding

E. Continuing efforts to foster cooperation between water resources and biological science professionals through participation in professional organizations and conferences.

F. Complete nutrient-food resources modeling effort for Central Valley rivers. This limnological study of mainstem, tributary and agricultural and wetland drainage systems throughout the Central Valley is being conducted by UC-Davis. The principal objectives are to: (1) determine spatial and temporal patterns in food resources and nutrients; (2) determine food and nutrient fluxes within the Sacramento and San Joaquin basins and to the Delta; (3) determine sources of nutrient and food resource loads; and (4) develop empirical models to define relationships between food resources and ecosystem-level physicochemical properties. Ancillary objectives include determining $^{15}\text{N}/^{14}\text{N}$ for selected systems (to help determine nitrogen loading sources) and developing a methodology for estimating streambed storage of food resources and nutrients. Data and model results from this project will contribute to improved understanding and prediction of: (1) food supply for invertebrates (fish food) in Central Valley rivers and floodplains; (2) hypoxia episodes in the Stockton Deepwater Ship Channel; (3) boundary conditions for DSM-2 or other Delta water quality models; and (4) water quality conditions in aqueducts and reservoirs conveying and storing water pumped from the Delta.

G. Support of development of procedures and models for conjunctive use. New storage available through management of ground water through recharge using excess flows has potential in areas where new surface storage is not possible. CALSIM II is the primary computer model for analyses of storage possibilities and incorporation of algorithms to address conjunctive use is a primary goal.

IV. Status of the Program.

The Ecological/Water Systems Operations Models, CVPIA Section 3406(g) program is a continuing program that started in 1994.

The program has supported the Ecosystem Modeling Consensus Project, designed to identify needed development of a credible consistent set of tools for supporting water resources and biological management decision; review and update of the Central Valley Ground-Surface water model (CVGSM); development of a GUI and database for PROSIM and SANJASM; and development of the 3-D temperature model for Whiskeytown Reservoir. These are projects that are completed, except for the GUI, which is changing direction as the models PROSIM and SANJASM have been replaced by CALIM II.

Since 1998 this program has supported a steadily increasing level of support for CALSIM II development and application with FY01 demanding more staff and resources than any earlier year. The California Department of Water Resources has made a tremendous investment in CALSIM and it has become clear that it is an excellent water resources simulation tool and that it is essential for Interior to participate in and guide its development and application.

The nutrient-food resources modeling project has nearly completed its second year of data collection at 25 sites throughout the Central Valley. Concentrations and fluxes of nutrients (phosphorus, nitrogen, silica) and lower trophic level food resources (sestonic algal biomass, fine particulate organic matter, dissolved organic carbon) have been measured biweekly for 12 systems in the Sacramento basin and 13 systems in the San Joaquin basin. Personnel and lab equipment await funding for continuation of sampling and completion of data analysis and report preparation in FY02.

V. FY 2001 Accomplishments.

The staff of the River Systems Analysis Group of MP-700, Reclamation's Technical Service Center, and Derek Hilts USFWS developed code and data for CALSIM II, reviewed releases of CALSIM I and CALSIM II, and conducted training for the greater modeling community.

The earlier GUI development for PROSIM and SANJASM was shifted to development of a GUI for available river and reservoir temperature models applied in the Central Valley and Trinity basin. This is a clear and direct response to the goal of making modeling technology more generally available and easier to use. This GUI provides more than an easy to use interface. Much more, in fact, because it allows data to be transferred between temperature models, allowing output from a detailed reservoir model to conveniently be passed onto the model being used for the river downstream of the dam. Models for Shasta Dam, the

Sacramento River, New Melones Dam, and the Stanislaus River were linked the GUI this past FY.

Nutrient-food resources modeling project accomplishments in FY01:

- _Measured 28 water quality constituents every two weeks at 25 stations located at or near continuous flow monitoring gages throughout the Central Valley.
- _Collaborated with US Geological Survey study in support of San Joaquin River Dissolved Oxygen Total Maximum Daily Load (TMDL) process.
- _Collaborated with TMDL Technical Advisory Committee study of Biochemical Oxygen Demand sources in the San Joaquin basin.
- _Conducted preliminary stable isotope ($^{15}\text{N}/^{14}\text{N}$) study using benthic invertebrate tissue samples collected at several locations in the San Joaquin basin.
- _Presented preliminary results at the American Geophysical Union's annual meeting in San Francisco.

Development of a comprehensive documentation of the hydrologic data required to support CALSIM II was contracted to MBK Engineering. This contract was awarded in mid-September with the first deliverable due in late October. The first deliverable is a table of contents identifying the data sets.

VI. Tasks, Costs, Schedules and Deliverables.

A. Narrative Explanation of Tasks (Listed in order of priority)

1. USBR program management. Contracting and Technical support is not identified explicitly here but is factored into to each contract.
2. Continuing USBR and USFWS support for CALSIM Development.
 - 2.1 USBR coding, review, and meeting participation
 - 2.2 USFWS review and meeting participation
- 3 Temperature model development - contract
- 4 Documentation of hydrologic data - contract
5. Writing CALSIM Users= Manual - contract
6. Participation in professional organizations
- 7 Nutrient-food resources modeling effort - grant
- 8 Development of procedures and models for conjunctive use
 - 8.1 Staff/ contract time for development

B. Schedule and Deliverables.

#	Task	Dates		Deliverable
		Start	Complete	
1	Program Management	10/01/01	09/30/02	A revised FY 2002 Annual Work Plan, draft FY03 AWP; awarding and management of grants and contracts.
1.1	PM (USBR)	10/01/01	9/30/02	See 1 above
2	Continuing support for CALSIM development	10/01/01	9/30/02	New versions of CALSIM, reviews by USFWS and other groups, DWR and private contributions, and meeting participation
2.1	USBR	10/01/01	9/30/02	New versions of CALSIM, reviews of other groups, DWR and private, contributions; and meeting participation
2.2	USFWS	10/01/01	9/30/02	Reviews of other groups, DWR and private, contributions; and meeting participation
3	Temperature model development (continuing)	2/1/02	9/30/02	Existing models of the Trinity, Feather and American River to be incorporated into the current suite of models with further development on the GUI.
4	Hydrologic data documentation	4/1/02	9/30/02	Completed manual of procedures for developing required time series input to CALSIM
5	CALSIM users=manual	1/1/02	6/30/02	CALSIM users=manual
6	Participation in professional organizations	10/1/01	9/30/02	Shared technology
7	Nutrient-food resources modeling effort	10/1/01	9/30/02	Complete published data set for three years (This is the final year of sampling), every two weeks at twenty-eight stations in Central Valley
8	Conjunctive Use Model Development	1/1/02	9/30/02	
8.1	Computer procedure development	2/1/02	6/30/02	Staff time or contract

Explanatory Notes:

C. Summary of Program Costs and Funding Sources.

#	Task	Total Cost	W&RR
1	Program Management	\$60,000	All funding from W&RR
1.1	PM (USBR)	\$60,000	
2	CALSIM Support	\$330,000	
2.1	CALSIM Support (USBR)	\$265,000	
2.2	CALSIM Support (USFWS)	\$65,000	
3	Temperature Model Development	\$140,000	
4	Hydrologic Data Documentation	\$50,000	
5	CALSIM Users= Manual	\$50,000	
6	Participation in professional organizations	\$10,000	
7	Nutrient-food resources modeling effort	\$100,000	
8	Conjunctive use model development	\$40,000	
8.1	Conjunctive Use (staff or contract)	\$40,000	
Total Program Budget		\$800,000	

Explanatory Notes:

VII. Future Years Commitments/Actions.

CALSIM development will continue for several years, requiring a large share of this funding. Second in priority will be temperature modeling. FY01 marked the beginning of updating of our temperature modeling technology. Two other water resources modeling activities that will increase over the coming years will be water quality modeling,, especially as it relates to the delta, and the lower San Joaquin; and conjunctive use modeling. Finally technical contributions which increase our ability to estimate risk. For example, placing error bounds on our estimate of deliveries to farms or fish.